Instrument- assisted soft tissue mobilization to the LOWER QUARTER

Allied Health Education

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Fascia

Old Definition

» Sheet or band of connective tissue that attaches to and separates skeletal muscles or internal organs

New Definition

» 3 dimensional collagen matrix that is attached to all of the biological structures which assists the body systems to operate in an integrated manner

Zugel, BJSM, 2018

Fascia
Functions

» **Mechanical Support - chains, slings or lines**
- **Local and *Regional***
- ***Impacts posture***

» **Movement**
- **Detects, Transmits, and modifies forces**
- **" Cellular crosstalk" among sensory receptors**

» **Visceral function**

Chaitow, 2012 , Lee & Lee 2013, Myers 2011

Myofascial Links

» **Tensegrity-**

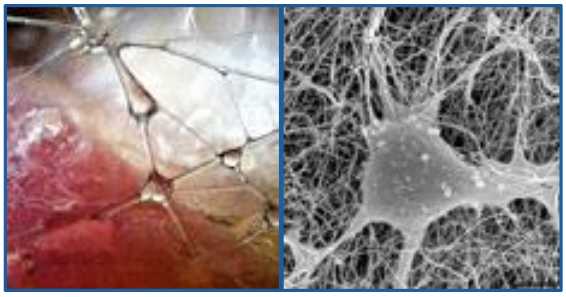
Transfer of tension through network of mechanoreceptors

FASCIAL CONNECTIONS

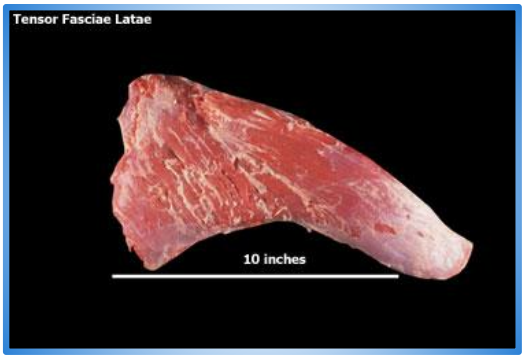
- **Deep fasciae**
- **Superficial fasciae**
- **Aponeurosis**
- **Epineurium**
- **Visceral fasciae**
- **Endomysium**
- **Tendons**
- **Epimysium**

- **Joint Capsule**
- **Meninges**
- **Ligaments**
- **Retinacula**
- **Tendon**
- **Intermuscular septa**
- **Dermis**
- **Perimysium**

Myofascial Links



Fasciae



Fascia

Factors Affecting Mechanical Properties

- **Fluid levels/ hydration**
- **Trauma (injury / surgery)**
- **Disease (ex: diabetes)**
- **Aging**
- **Activity level**
- **Nutrition**

Fascia
Inflammation

Acute

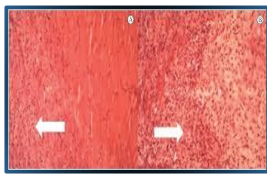
- **Necessary response for tissue healing / regeneration**
- **Applic : Long-term use of NSAIDS may inhibit muscle growth**

Chronic

- **Excessive response**
- **⇧ Fibrosis (collagen)⇨**
- **Tethering/ compression of soft tissues ⇨ pain**
- **"Spillover" of inflammatory cytokines into bloodstream**
- **Central nociceptor stim.**
- **Fatty infiltration / mm atrophy (ex : Disc injury**
- **Applic: ⇩Strength gains in elderly**

Fascia
Effects of Excessive Fibrosis

- **⇩ Tissue regeneration**
- **⇩ Muscle growth**
- **⇩ Neuromuscular performance**
  - **Ex- Power generation**
- **⇧ Chronic MSK pain**



SUPERFICIAL BACK LINE

- Epicranial fascia
- Erector / sacrolumbarfascia
- Sacrotuberous ligament
- Hamstrings
- Gastrocnemius
- Achilles Tendon
- Plantar fascia

LATERAL LINE

- Splenius Capitis
- Sternocleidomastoid
- External/ internal intercostals
- Gluteus Maximus
- Tensor Fasciae
- Iliotibial tract
- Lateral compartment
- Peroneal muscles

SPIRAL LINE

- Splenius capitis /cervicis
- Rhomboid Major / Minor
- Serratus Anterior
- External/Internal Oblique
- TFL/ ITB
- Tibialis Anterior
- Biceps femoris
- Sacrotuberous Liagament
- Sacrolumb fascia/ Erector Spinae

SPIRAL LINE

SUPERFICIAL FRONT LINE

- Sternocleidomastoid
- Rectus Abdominis
- Quadriceps Tendon
- Anterior Compartment
- Tibialis Anterior

BACK FUNCTIONAL LINE

- Latissimus Dorsi
- Thoraco-lumbar Fascia
- Sacral Fascia
- Gluteus Maximus
- Vastus Lateralis
- Quadriceps Tendon

Trigger Point

Trigger Point vs. Fibrosis

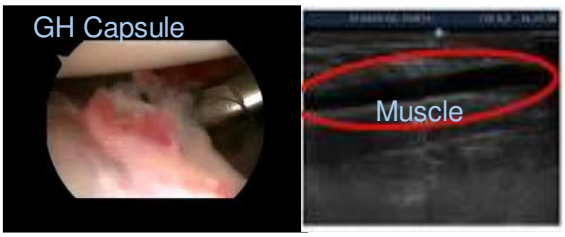
» **Fibrosis - ▲ *M*uscle hardness**

- **Collagen deposition / chemical △'s**

» **Trigger Point - ▲ *M*uscle hardness**

- **Symptomatic**
- **Pressure elicits symptoms**

Fibrosis



Instrument-Assisted Soft Tissue Mobilizations

- IASTM

Fascia

Biological Effects of IASTM / STM

- ⇧ Arterial perfusion
- ⇧ Fascial sliding
- Neuromodulation
  - ⇩Pain
  - △ Muscle activity

- ⇧ Reabsorption of fibrosis
- " Break up" adhesions ?

Fascia

Patient Benefits of IASTM /STM

- Prevent overuse/ chronic - induced fibrosis
- ⇧ Recovery from muscle soreness
- ⇧ Short-term flexibility
- May ⇩ Chronic musculoskeletal pain

Fascia

Clinician Benefits of IASTM /STM

- ⇩ Stress on hands
  - CMC joint
- ⇧ Barrier
- ⇧ Specificity of targeted tissue

Indications

- Trigger points/ MFP
- Chronic tendinopathies
- Adhesions / fibrosis /excessive scar
- Neuromuscular imbalances
- Scapula Dyskinesis
- Postural Dysfunction
- *Ligament sprains (i.e. UCL)*
- *Nerve entrapments (CTS, TOS)*

} Movement Disorder

Absolute Contraindications

- Inflammatory or infectious skin conditions
  - Psoriasis, dermatitis, eczema, cellulitis, shingles, Athlete's foot, foot- mouth disease
- Impaired skin integrity
  - Open Wound / non- closed wound margins
- Directly over surgical incision
  - Fibroblastic stage 0-12 weeks
- Directly over ecchymosis/effusion
- Directly over acutely traumatized tissue
- Directly over unstable fractures
- Hematoma/ myositis ossificans
- Osteomyelitis
- Blood thinning MEDS

Relative Contraindications

- Varicose veins
- Cancer
- Body art
- CRPS
- Polyneuropathies
- Unhealed, closed non- complicated fractures
- Autoimmune disorders
- Diabetes

Relative Contraindications

- Rheumatoid arthritis
- Ankylosing spondylitis
- Adjacent to pacemakers, insulin pumps
- Post- injection (i.e. PRP)
- Lymphedema
- Central sensitization / hypersensitivity

Tissue Prep

- **Massage cream**
- **Moisturizing lotion**

Ex : Albolene ™

- **Ultrasound gel**

Tool Cleaning

Medical Grade Disinfectant / Cleaner

☞ **After every use !**

- **MRSA**

Ex : Protex™

LEVELS OF EVIDENCE

- **Individual Studies**

I	Evidence obtained from high-quality diagnostic studies, prospective studies, or randomized controlled trials
II	Evidence obtained from lesser-quality diagnostic studies, prospective studies, or randomized controlled trials (eg, weaker diagnostic criteria and reference standards, improper randomization, no blinding, less than 80% follow-up)
III	Case-controlled studies or retrospective studies
IV	Case series
V	Expert opinion

KELLEY MJ. JOSPT, 2013: 43(5)

GRADES OF EVIDENCE

- Synthesis of studies ► ► ► Recommendations

GRADES OF RECOMMENDATION BASED ON		STRENGTH OF EVIDENCE
A	Strong evidence	A preponderance of level I and/or level II studies support the recommendation. This must include at least 1 level I study
B	Moderate evidence	A single high-quality randomized controlled trial or a preponderance of level II studies support the recommendation
C	Weak evidence	A single level II study or a preponderance of level III and IV studies, including statements of consensus by content experts, support the recommendation
D	Conflicting evidence	Higher-quality studies conducted on this topic disagree with respect to their conclusions. The recommendation is based on these conflicting studies
E	Theoretical/ foundational evidence	A preponderance of evidence from animal or cadaver studies, from conceptual models/principles, or from basic science/bench research supports this conclusion
F	Expert opinion	Best practice based on the clinical experience of the guidelines development team

KELLEY MJ. JOSPT, 2013: 43(5)

Research

» Several case reports /case series

» Some basic science studies

» Recent RCT's & Systematic Reviews

☞ Protocols/ approaches based on Level 5 evidence (expert opinion)

Research

- **Nielsen 07'** - ↑ in surface circulation ↓ pain locally and distal.
- **Lambert, M. Phys. Ther. Reviews. 2017**
  - **Systematic review**
  - Significant short-term (< 3 mos.)⇩ in pain and/or ⇧ ROM vs. control and/ or other tx. groups
- **Moon, JH. J. Phys Ther Sci.**
  - **RCT**
  - IASTM superior to static hamstring stretches on immediate hamstring flexibility on pts. w non-specific LBP

Research

- **Gulick, D. J. Bodyworks & Movement Ther. 2017 -**
  - **RCT** – 3 groups of pts w UT trigger points
    - IASTM – 3 techniques applied 6x over 3 weeks
    - ⇧ UT PPT in all 3 groups

- **Miller, S - JOSPT 2018**
  - **RCT** – 3 groups of pts w UT trigger points
  - IASTM vs. static stretching vs. self STM (Theracane)
  - Significantly greater improvements in cervical ROM and PPT in IASTM group

Research

Increase career longevity

- 68 % of PT experience thumb pain.
- Of these, 25% will retire or change professions
- Based on 1102 Australian Physiotherapists

McMahon- Australian J of PT 06'

IASTM

- **Tool Selection**
  - **Buffalo Horn**
  - **Jade Stone**
  - **Stainless Steel**

- **IASTM TOOLS**

IASTM Principles / Parameters

- Scanning vs. mobilizing tissue
- Clinician technique
- Tissue depth of application
- Frequency
- Duration
- Treatment objective
- Tissue Reactivity
- Treatment Sequence

IASTM Principles / Parameters

» **Scanning = Assessing the tissue**

- Parallel to muscle/ Both directions
- Superficial ☛ Deep
- Assess for resistance
  - "Bump" - Trigger point
  - Grainy or gritty feel- Fascial

» **Treatment**

- Multiple angles
- Superficial ☛ Deep

IASTM Principles / Parameters

» Clinician Technique

- Two hand technique
  - Tissue is on slack ☛ Deep effect
- One hand technique
  - Take up soft tissue slack with non-instrument hand ☛ Superficial effect
- Application angle : 30° to 60°

IASTM Principles / Parameters

» Tissue Depth = Pressure

Variables affecting tissue depth

A. Degree of tissue tension / slack
B. Degree of force
C. Angle of application
   - ⇧ Angle ⇨ Deeper effect

B. Tool surface
   - Concave vs. convex
   - Large vs. small surface
   - Sharp vs. dull surface area
     - ❖ More Superficial effect

Tool Features

Superficial (Fasciae)

Larger surface area
Sharp/ thinner edges
Concave edges

Deep Structures (Muscle)

Smaller surface area
Dull/ thicker edges
Convex edges

IASTM Principles / Parameters

» **Frequency**
- ♦ 2-3 x's / week (2- 3 days in between)

» **Duration**
- ♦ Per session: 8-10 min
- ♦ Per structure / muscle : 3-10 minutes
  - Knee MCL - 2 min
  - ITB - 8-10 min
  - PIGH shoulder capsule - 4 to 5 min

IASTM Principles / Parameters

» **Treatment objective**
- ♦ ⇩Pain /edema (Acute)
  - Non- aggressive
- ♦ ⇧ ROM / Disrupt fibrotic tissue
  - More aggressive
  - Ecchymosis is normal
  - STOP if petechiae is produced
  - Bruising is not necessary

» **Tissue Reactivity**
- Must adjust parameters !

IASTM Principles / Parameters

» **Treatment Sequence**

Pre - Treatment : Warm Up Tissue

- Active (i.e. UBE, Bike, Elliptical or T- Mill)
- Passive (Modalities- Heat, lazer US, Paraffin)

» **Post – Treatment**

- Therex. / Neuromuscular re-education
- Soft tissue / joint mobilizations
- Cryotherapy
  - ☒ Not indicated if goal is to incite an inflammatory response (i.e. tendinopathy or ligament sprain)

Mobilization Techniques

STROKES

1. **Sweep - Basic stroke**
   - Tool edge- 30-60° angle to body surface
2. **J - Stroke**
   - Pencil grip
   - Tool edge- 30-60° angle
3. **Strum**
   - Deep stroke
   - Tool edge- 60-90° angle

Mobilization Techniques

STROKES

4. **Scoop**
   - Tool edge - 90° angle
   - Deep tissue
5. **Brushing/ Framing**
   - Light/ De- sensitizing strokes
   - Bony prominences (ex: scapula, patella)
6. **Fanning**
   - Hold one end of tool stationary
   - Move other end- fan like pattern

BASIC TECHNIQUES

Lower Trapezius

» Common indications
- Promote LT muscle activation
- Scapula dyskinesis
- LT trigger point
- Subacromial/ coracoid impingement
- Forward shoulder posture

Lower Trapezius

- Video

Latissimus Dorsi

» Common indications
- ⇩ Shoulder ROM
  - ⇩ Abduction> flexion
- Forward shoulder posture
- Post high intensity training
  - Ex: Deadlifts, Crossfit
- Lat Dorsi trigger point

PIGH – Posterior- Inferior Glenohumeral

Latissimus Dorsi

- Video

Thoraco-Lumbar

» Structures
- Thoraco-lumbar fasciae
- Erector Spinae
- Superficial back fascial line
- Back functional fascial line

Thoraco-Lumbar

» Common indications
- ⇩ T-L Spine ROM
  - ⇩ Flexion > lateral flexion / rotation
- Low Back Pain
- Post high intensity training
  - Ex: Deadlifts, Crossfit
- TL trigger point

PIGH – Posterior- Inferior Glenohumeral

Thoraco-Lumbar 1

- Video

Iliac Crest

» Common indications
- Lumbosacral pain
- Lumbar instability
- Iliac crest pain

» Structures
- Iliolumbar ligament
- Lumbar multifidus
- Lateral fascial line

Iliac Crest

- Video

Quadratus Lumborum

» **Common indications**
- **Weak/ tight QL**
- **Lumbo- pelvic (core) instability**
- **Hip flexor tightness**

» **Structures**
- **Iliolumbar ligament**
- **Lumbar multifidus**
- **Lateral fascial line**

Quadratus Lumborum

- VIDEO

Gluteal Medius Tendon & Post. ITB

» Structures
- ITB-Hamstring fascial connection
- Gluteus medius/ minimus tendons
- Lateral fascial line / Back functional line

» Common indications
- Gluteal medius/ minimus tendinopathy
- Hamstring tightness
- Trochanteric bursitis
- ITB syndrome
- Sciatic nerve restrictions

Gluteal Medius Tendon & Posterior ITB

- VIDEO

ITB - Vastus Lateralis Junction

» Structures
- ITB- VL fascial connection
- VL / ITB
- Spiral Fascial Line

» Common indications
- VL/ TFL trigger points
- Quadriceps (VL) tightness
- Iliopsoas tightness
- ITB Syndrome
- Post high intensity training
  - Ex: Squats, Crossfit

ITB- Vastus Lateralis Junction 1

- VIDEO

ITB- Vastus Lateralis Junction -2

- VIDEO

Hip Adductors

» Structures
- Adductor longus, magnus and brevis
- Gracilis
- Pectineus

» Common indications
- Adductor strains (post- acute phase)
- Adductor weakness/ tightness
- Iliopsoas tightness
- Core instability

Hip Adductors

- VIDEO

Anterior Thigh- Quadriceps

» Structures
- Quadriceps
- Superficial front fascial line
- Spiral Fascial Line

» Common indications
- Quadriceps trigger points
- Quadriceps/ iliopsoas tightness
- Femoral nerve entrapment /restrictions
- Patellofemoral pain synrome
- Post high intensity training
  - ☛ Ex: Squats, Crossfit

Anterior Thigh 1

- VIDEO

Quadriceps Tendon

» Structures
- Quadriceps tendon /quadriceps muscle
- Back functional line

» Common indications
- Quadriceps tendinopathy

Quadriceps Tendon

- VIDEO

Lat. Retinaculum. Distal ITB

» Structures
- ITB/ lateral retinaculum
- Quadriceps
- Superficial front fascial line
- Lateral fascial line
- Spiral fascial line
- Back functional fascial line

» Common indications
- ITB friction syndrome
- Anterior knee pain/ PFP
- Peroneal tendinopathy

Lateral Retinaculum/ Distal ITB

- VIDEO

Lateral Patella

- VIDEO

Lateral Retinaculum/ Distal ITB/ Patella Tendon

- VIDEO

Patella Tendon

» Structures
- Patella tendon
- Anterior tibialis

» Common indications
- Patella tendinopathy
- Anterior /medial tibial stress syndrome

Patella Tendon

- VIDEO

Medial Knee

» Structures
- MCL
- Medial retinaculum

» Common indications
- MCL Sprain
- Non-specific medial knee pain

Medial Knee

- VIDEO

Posterior Knee

» **Structures**
- Posterior knee capsule
- Gastrocnemius
- Hamstring
- Superficial back functional line

» **Common indications**
- ⇩ Knee Extension ROM
- Hamstring / gastrocnemius tightness
- ⇩ Knee joint swelling

Posterior Knee

- VIDEO

Lateral Compartment

» Structures
- Peroneal muscles
- Lateral fascial line

» Common indications
- Peroneal tendinopathy
- ITB friction syndrome
- Lateral plantar nerve entrapment
- Peroneal nerve entrapment/ restrictions

Lateral Compartment

- VIDEO

Posterior Lower Leg

» Structures
- Superficial back line
- Gastroc-soleus muscles

» Common indications
- Achilles tendinopathy
- Plantar fascitis
- ⇩ Ankle ROM (DF)

Posterior Lower Leg

- VIDEO

Anterior Lower Leg- Ankle

» **Structures**
- Superficial front line
- Anterior compartment
- Ankle retinaculum

» **Common indications**
- Anterior ankle impingement
- Anterior/ Medial Tibial Stress Syndromes
- ⇩ Ankle ROM (PF)

Anterior Lower Leg - Ankle

- VIDEO

Lateral Ankle

» Structures
- Lateral ankle ligaments (ATFL)
- Lateral retinaculum
- Lateral fascial line
- Peroneal tendons

» Common Indications
- Peroneal tendinopathy
- Ankle sprains (post –acute phase)
- ⇩ Ankle AROM (Inversion)

Lateral Ankle

- VIDEO

» Structures
- Lateral ankle ligaments (ATFL)
- Lateral retinaculum
- Lateral fascial line
- Peroneal tendons

» Common Indications
- Peroneal tendinopathy
- Ankle sprains (post –acute phase)
- ⇩ Ankle AROM (Inversion)

Plantar Fascia 1

- VIDEO

Plantar Fascia 2

- VIDEO

ADVANCED TECHNIQUES

Thoraco-Lumbar 2

- VIDEO

Thoraco-Lumbar 3

- VIDEO

Thoraco-Lumbar 4

- VIDEO

Iliolumbar Ligament

» Common indications
- Lumbosacral pain
- Lumbar instability
- Iliac crest pain

Iliolumbar Ligament

Anterior Thigh 2

Re - Assessment

Importance

- **Effectiveness of treatment ?**
- **Increase patient " buy in"**

What to Re-Assess

- **Concordant / comparable sign- The familiar chief complaint (pain or other symptom) that is produced by a movement , position or accessory joint motion**

- **Objective asterisk - Clinical exam**
- **Functional asterisk - Clinical exam**
- **Subjective asterisk - Reported by patient**

CASE STUDY

- Michelle is a 45 year-old dental assistant
- Recreational athlete/ runner
- Runs 3X / week – 2 miles

Current Complaints
Reason for seeking treatment

» **Chief complaint: R > L Lumbar/ QL pain** (P1)
- Provoked with work tasks (standing/ leaning forward)

»**Secondary complaint: ⇩ Trunk flexion** (P2)
- Limited by tightness/ discomfort (P1 location)

» Tertiary c/o "tightness" in R > L hips (P3)
- Difficult crossing legs to put socks on
- No c/o tingling/ numbness or weakness in LE's

INITIAL EVALUATION

Observation/ Inspection –Key Findings

» Slouched posture
» Lower right shoulder

» Increased lumbar lordosis
  ♦ ⇧ Anterior pelvic tilt

» Genu Valgus
» ⇧ Pronation

INITIAL EVALUATION

Functional Tests

» Functional Asterisks
- Active trunk flexion- P1

» Sitting /Crossing Leg (Hip ER)
- Reproduced P1

» Deep Squat (FMS)
- Excessive trunk flexion
- Reproduced P1

Objective Findings

➢ Special tests
- (-) SLR
- + Thomas/ Modified Thomas test
- + FABER (R)
- + Hamstring tightness
- (-) Gower's sign
- (-) Prone lumbar instability test

➢ Palpation
- (+) Tenderness / soft tissue hardness / " guarding" at R>L lumbar paraspinals
- Trigger pain referral pattern with deep pressure to (R) G.Medius and right lumbar paraspinals

Objective Findings

- **AROM/ PROM**
  - ⇩ Hip ER (R > L)
  - ⇩ Hip Extension
  - ⇩ Ankle DF
- **Muscle Strength**
  - ⇩ Hip Abduction (R > L)
- **Normal neurological screening to LE**

Hypothesis / Impairment list

» Diagnosis
- Non-Specific LBP / Postural dysfunction
- Negative findings for lumbar instability (EBP)
- Negative findings for sciatica/ radiculopathy

» Key Impairments
- ⇩ Lumbar AROM
- ⇩ Hip AROM (R)
- Poor posture
- Hip /core weakness

IASTM Treatment

» R QL / Bilateral lumbar paraspinals
- Re-assess functional asterisk (P1)= Trunk Flex

» Glut. medius/ ITB
- Re-assess functional asterisk / (P2) = Crossing leg

» Quadriceps/ iliopsoas / gastrocnemius= Squat
- Re-assess functional asterisk / (P3)

- Other interventions : Hip/Core strengthening
  Hip / Lumbar mobilizations
  Postural Restoration Exercises

Course Completion

You have completed the course

Instrument – Assisted Soft Tissue Mobilizations to the Upper Quarter

THANK YOU.

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